What is claimed is:

1. An optical transmitting apparatus for a ring transmission system used in a ring transmission system in which a plurality of optical transmitting apparatuses are connected to one another over a bidirectional ring transmission path having a data link channel in which crossconnect information representing an add node identifier representing a node adding an optical signal and a drop node identifier representing a node dropping an optical signal is written, said optical transmitting apparatus comprising:

a data link reading means for reading said crossconnect information and topology information uniquely representing the order of arrangement of optical transmitting apparatuses connected in ring;

a topology creating means for creating a topology using said topology information read by said data link reading means;

a data link writing means for writing a unique absolute node identifier given to each of said plural optical transmitting apparatuses and a relative node identifier given by relating absolute node identifiers of other nodes with said topology in said crossconnect information of said data link channel on the basis of said topology created by said topology

creating means; and

a squelch table creating means for creating a squelch table holding said crossconnect information written in said data link channel.

2. An optical transmitting apparatus for a ring transmission system used in a ring transmission system in which a first ring transmission system in which a plurality of optical transmitting apparatuses are connected to one another over a bidirectional ring transmission path having a data link channel in which crossconnect information representing an add node identifier representing a node adding an optical signal and a drop node identifier representing a node dropping the optical signal is written is coupled with a second ring transmission system in which a plurality of optical transmitting apparatuses are connected to one another over a bidrectional ring transmission path having said data link channel; said optical transmitting apparatus comprising:

a data link reading means for reading said crossconnect information of said data link channel and topology information uniquely representing the order of arrangement of optical transmitting apparatuses connected in ring;

a topology creating means for creating a topology using said topology information read by said

data link reading means;

a data link writing means for writing a unique absolute identifier given to each of a plurality of optical transmitting apparatuses and a relative node identifier given by relating absolute node identifiers of other nodes with said topology in said crossconnect information of said data link channel on the basis of said topology created by said topology creating means;

a squelch table creating means for creating a squelch table holding said crossconnect information written in said data link channel;

an RIP table creating means for creating an RIP table holding a primary node identifier indicating a primary node which transmits said optical signal from said first ring transmission path to said second ring transmission path, a secondary node identifier indicating a secondary node adjacent to said primary node to transmit/receive said optical signal, and said drop node identifier for each of a working line and a protection line on the basis of said crossconnect information; and

a node recognizing means being able to recognize from said relative node identifier of said crossconnect information read by said data link reading means which its own node is said primary node or said secondary node.

3. The optical transmitting apparatus for a ring transmission system according to claim 1, wherein said data link writing means sets an absolute node identifier of its own node to said add node identifier of said data link channel when its own node is said add node, and sets said drop node identifier of said data link channel to a relative node identifier of its own node corresponding to said add node identifier when its own node is said drop node.

4. The optical transmitting apparatus for a ring transmission system according to claim 2, wherein said data link writing means sets an absolute node identifier of its own node to said add node identifier of said data link channel when its own node is said add node, and sets said drop node identifier of said data link channel to a relative node identifier of its own node corresponding to said add node identifier when its own node is said drop node.

5. The optical transmitting apparatus for a ring transmission system according to claim 1, wherein data other than zero is used as said relative node identifier set by said data link writing means, and said node recognizing means recognizes presence or absence of zero data in a region in which said drop

node identifier of said data link channel is written to determine whether or not setting of said crossconnect information is completed.

6. The optical transmitting apparatus for a ring transmission system according to claim 2, wherein data other than zero is used as said relative node identifier set by said data link writing means, and said node recognizing means recognizes presence or absence of zero data in a region in which said drop node identifier of said data link channel is written to determine whether or not setting of said crossconnect information is completed.

7. The optical transmitting apparatus for a ring transmission system according to claim 2, wherein said node recognizing means comprises:

an additional information determining means being able to determine which a connection mode of said first ring transmission system or said second ring transmission system is in a DCP connection in which said optical signal is dropped from said primary node while continued over said protection line or in a DTP connection in which said optical signal is continued over both of said working line and said protection line on the basis of information written in said squelch table.

8. The optical transmitting apparatus for a ring transmission system according to claim 7, wherein said additional information determining means determines which said first ring transmission system or said second ring transmission system is in said DCP connection or in said DTP connection from which a direction of its own node identifier indicating its own node looked from said primary node identifier is in the same direction as or in the opposite direction to the order of arrangement of nodes represented by said topology.

9. The optical transmitting apparatus for a ring transmission system according to claim 1, wherein said squelch table creating means is such configured as to create the same squelch table among optical transmitting apparatuses of said ring transmission system.

10. The optical transmitting apparatus for a ring transmission system according to claim 2, wherein said squelch table creating means is such configured as to create the same squelch table among optical transmitting apparatuses of said ring transmission system.

11. The optical transmitting apparatus for a ring transmission system according to claim 2, wherein said RIP table creating means is such configured as to create the same RIP table among optical transmitting apparatuses of said ring transmission system.

12. An optical transmitting method for a ring transmission system used in a ring transmission system in which a plurality of nodes are connected to one another over a bidirectional ring transmission path having a data link channel in which crossconnect information representing an add node identifier representing a node adding an optical signal and a drop node identifier representing a node dropping an optical signal is written, said optical transmitting method performed in each of said node comprising the steps of:

a data link reading step of reading said crossconnect information and topology information uniquely representing the order of arrangement of optical transmitting apparatuses connected in ring;

a topology creating step of creating a topology using said topology information read at said data link reading step;

a data link writing step of writing a unique absolute node identifier given to each of a plurality

of nodes and a relative node identifier given by relating absolute node identifiers of other nodes with said topology in said crossconnect information of said data link channel on the basis of said topology created at said topology creating step; and

a squelch table creating step of creating a squelch table holding said crossconnect information written in said data link channel.

13. An optical transmitting method for a ring transmission system used in a first ring transmission system in which a plurality of nodes are connected to one another over a bidirectional ring transmission path having a data link channel in which crossconnect information representing an add node identifier indicating a node adding an optical signal and a drop node identifier indicating a node dropping the optical signal is written, and a second ring transmission system in which a plurality of nodes are connected to one another over a bidirectional ring transmission path having said data channel,

wherein said first ring transmission system comprises:

a first add/drop node for receiving an optical signal transmitted from an external node over a working line and transmitting said optical signal to another node of said first ring transmission

system over said working line, while receiving an optical signal transmitted from another node of said first ring transmission system over said working line;

a first primary node for receiving said optical signal transmitted from said first add/drop node over said working line and transmitting said optical signal to an external ring transmission system and another node of said first ring transmission system over said working line, while receiving an optical signal transmitted from said external ring transmission system over said working line and an optical signal transmitted from another node of said first ring transmission system over a protection line, selecting either one of said received optical signals, and transmitting said selected optical signal to another node of said first ring transmission system over said working line;

a first secondary node for receiving said optical signal transmitted from said first primary node over said protection line and transmitting said optical signal to said external ring transmission system over said protection line, while receiving said optical signal transmitted from said external ring transmission system over said protection line and transmitting said optical signal to said first primary node over said protection line;

said second ring transmission system

comprises:

a second seconary node for receiving said optical signal transmitted from said first secondary node of said first ring transmission system over said protection line and transmitting said optical signal to said second ring transmission system over said protection line;

a second primary node for receiving an optical signal transmitted from said first primary node of said first ring transmission system over said working line and said optical signal transmitted from said second secondary node over said protection line and transmitting said optical signal to another node of said second ring transmission system over said working line, while receiving an optical signal transmitted from another node of said second ring transmission system over said working line, transmitting said optical signal to said first primary node of said first ring transmission system, and transmitting said optical signal to said second secondary node;

a second add/drop node for receiving an optical signal transmitted from an external ring transmission system over said working line and transmitting said optical signal to another node of said second ring transmission system over said working line, while receiving said optical signal transmitted

from another node of said second ring transmission system over said working line and transmitting said optical signal to said external ring transmission system over said working line;

said optical transmitting method performed in each of said nodes comprising the steps of:

a data link reading step of reading said crossconnect information of said data link channel and topology information uniquely representing the order of arrangement of optical transmitting apparatuses connected in ring;

a topology creating step of creating a topology using said topology information read at said data link reading step;

a data link writing step of writing a unique absolute node identifier given to each of a plurality of nodes and a relative node identifier given by relating absolute node identifiers of other nodes with said topology in said crossconnect information of said data link channel on the basis of said topology created at said topology crating step;

a squelch table creating step of creating a squelch table holding said crossconnect information written in said data link channel;

an RIP table creating step of creating an RIP table holding a primary node identifier indicating a primary node transmitting said optical signal from

said first ring transmission path to said second ring transmission path, a secondary node identifier indicating a secondary node adjacent to said primary node to transmit/receive said optical signal, and said drop node identifier for each of said working line and said protection line on the basis of said crossconnect information; and

a node recognizing step of recognizing from said relative node identifier of said crossconnect information read at said data link reading step which its own node is said primary node or said secondary node.

14. An optical transmitting method for a ring transmission system used in a first ring transmission system in which a plurality of nodes are connected to one another over a bidirectional ring transmission path having a data link channel in which crossconnect information representing an add node identifier indicating a node adding an optical signal and a drop node identifier indicating a node dropping an optical signal is written and a second ring transmission system in which a plurality of nodes are connected to one another over a bidirectional ring transmission path having said data link channel,

wherein said first ring transmission system comprises:

a first add/stop node for receiving an optical signal transmitted from an external node over a working line, transmitting said optical signal to said first ring transmission system over said working line, and transmitting said optical signal to said first ring transmission system over a protection line, while receiving an optical signal transmitted from another node of said first ring transmission system over said working line, receiving an optical signal transmitted from another node of said first ring transmission system over said protection line, and transmitting said optical signal to an external ring transmission system over said working line;

a first primary node for receiving said optical signal transmitted from said first add/drop node over said working line, and transmitting said optical signal to an external ring transmission system and another node of said first ring transmission system over said working line, while receiving an optical signal transmitted from said external ring transmission system over said working line and an optical signal transmitted from another node of said first ring transmission system over said protection line, selecting either one of said received optical signals, and transmitting said selected optical signal to another node of said first ring transmission system over said working line;

a first secondary node for receiving an optical signal transmitted from said first add/drop node over said protection line, and transmitting said optical signal to a node of said external ring transmission system over said protection line, while receiving an optical signal transmitted from a node of said external ring transmission system over said protection line, and transmitting said optical signal to said first add/drop node over said protection line;

said second ring transmission system comprises:

a second primary node for receiving said optical signal transmitted from said first primary node of said first ring transmission system over said working line, and transmitting said optical signal to another node of said second ring transmission system over said working line, while receiving an optical signal transmitted from another node of said second ring transmission system over said working line, and transmitting said optical signal to said first primary node of said first ring transmission system over said working line;

a second secondary node for receiving an optical signal transmitted from said first secondary node of said first ring transmission system over said protection line, and transmitting said optical signal to another node of said second ring

transmission ring over said protection line, while receiving said optical signal transmitted from another node of said second ring transmission system over said protection line, and transmitting said optical signal to said first secondary node of said first ring transmission system over said protection line;

a second add/drop node for receiving said optical signal transmitted from said second primary node over said protection line, receiving said optical signal transmitted from another node of said second ring transmission system over said working line, and transmitting said optical signal to an external ring transmission system over said working line, while receiving an optical signal transmitted from said external ring transmission system over said working line, transmitting said optical signal to another node of said second ring transmission system over said working line, and transmitting said optical signal to another node of said second ring transmission system over said protection line;

said optical transmitting method performed in each of said nodes comprising the steps of:

a data link reading step of reading said crossconnect information of said data link channel and topology information uniquely representing the order of arrangement of optical transmitting apparatuses

connected in ring;

a topology creating step of creating a topology using said topology information read at said data link reading step;

a data link writing step of writing a unique absolute node identifier given to each of a plurality of nodes and a relative node identifier given by relating absolute node identifiers of other nodes with said topology in said crossconnect information of said data link channel on the basis of said topology created at said topology creating step;

a squelch table creating step of creating a squelch table holding said crossconnect information written in said data link channel;

an RIP table creating step of creating an RIP table holding a primary node identifier indicating a primary node transmitting said optical signal from said first ring transmission path to said second ring transmission path, a secondary node identifier indicating a secondary node adjacent to said primary node to transmit/receive said optical signal, and said drop node identifier for each of said working line and said protection line on the basis of said crossconnect information; and

a node recognizing step of recognizing from said relative node identifier of said crossconnect information read at said data link reading step which

its own node is said primary node or said secondary node.

15. The optical transmitting method for a ring transmission system according to claim 12, wherein at said data link writing step, data other than zero is used as said relative node identifier.

16. The optical transmitting method for a ring transmission system according to claim 13, wherein at said node recognizing step, presence or absence of zero data in a region in which said drop node identifier of said data link is written is recognized to determine whether or not setting of said crossconnect information is completed.

17. An optical transmitting apparatus for a ring transmission system used in a transmission ring in which a plurality of optical transmitting apparatuses are connected to one another over a bidirectional ring transmission path comprising:

a connection mode recognizing means, connected to said bidirectional ring transmission path, for recognizing a connection mode between said transmission ring and another transmission ring connected to said transmission ring;

a failed span detecting means, connected to

said connection mode recognizing means, for detecting a span in which a failure occurs; and

a loop-back switching control means, connected to said connection mode recognizing means and said failed span detecting means, for switching a transmission route on the basis of said connection mode and said span.

18. The optical transmitting apparatus for a ring transmission system according to claim 17, wherein said connection mode recognizing means centrally recognizes information on a terminal optical transmitting apparatus connected to said bidirectional ring transmission path to add/drop said optical signal, connection mode information on said connection mode of said terminal optical transmitting apparatus, and line type information representing a working/protection line type.

19. The optical transmitting apparatus for a ring transmission system according to claim 18, wherein said connection mode recognizing means recognizes a DTP connection in which at least two of said terminal optical transmitting apparatuses connected to said transmission ring continue to transmit said optical signal using both of said working line and said protection line.

20. The optical transmitting apparatus for a ring transmission system according to claim 17 further comprising:

a path switching means, connected to said loop-back switching control means, for selecting either one having a better quality of a first optical signal from one direction and a second optical signal from another direction on said bidirectional ring transmission path.

21. An optical transmitting method for a ring transmission system used in a transmission ring in which a plurality of optical transmitting apparatuses are connected to one another over a bidirectional ring transmission path, said optical transmitting method comprising the steps of:

a connection mode recognizing step of recognizing a connection mode between said transmission ring and another transmission ring connected to said transmission ring;

a failed span detecting step of detecting a span in which a failure occurs on the basis of said connection mode recognized at said connection mode recognizing step; and

a loop-back switching controlling step of switching a transmission route on the basis of said

connection mode recognized at said connection mode recognizing step and said span detected at said failed span detecting step in order to minimize a loop-back distance of an optical signal in said transmission ring.